Hardware Guide

E8 Series Storage Enclosure

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www.fibrenetix.com

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Fibrenetix operates a Return to Factory warranty. The period of this warranty is three (3) years. Warranty registration for your Fibrenetix E8 Series should be completed electronically via the web. Please register for the Return to Factory warranty at www.fibrenetix.com.

Technical Support Policy

If you have a problem installing your system or suspect it is malfunctioning, please contact Fibrenetix Support via email: support@fibrenetix.com, or register your support issue via our website: www.fibrenetix.com. Please have the model, serial number, date of purchase and the distributor/reseller's name available, as you will need to provide this information to our support team.

Return of Product

If a distributor or Fibrenetix deems it necessary for a system to be returned for testing or servicing, a Return Materials Authorization (RMA) number will be issued. The RMA number must be placed on the outside of the carton in large, visible letters near the address label. Return the complete system including all cables and software. The system must be packed in the original packing materials and shipped prepaid. Fibrenetix will repair the system and return it prepaid by similar common carrier and priority. Please record the RMA number and make reference to it when enquiring on the status of the system.

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Preface

This User Guide describes the installation, configuration and operation of the following products:

- E8-1264-F281, 12 drive bay, single controller RAID subsystem with quad 8 gigabit Fibre Channel interfaces (total 4 x 8gigabit F/C ports)
- E88-1264-F281, 12 drive bay dual controller RAID subsystem with quad 8 gigabit Fibre Channel interfaces per RAID controller (total 8 x 8gigabit F/C ports)
- E8-1664-F281, 16 drive bay, single controller RAID subsystem with quad 8 gigabit Fibre Channel interfaces (total 4 x 8gigabit F/C ports)
- E88-1664-F281, 16 drive bay dual controller RAID subsystem with quad 8 gigabit Fibre Channel interfaces per RAID controller (total 8 x 8gigabit F/C ports)
- E8-1262-J31 JBOD Expansion enclosure.
- E88-1262-J31 JBOD Expansion enclosure.
- E8-1662-J31 JBOD Expansion enclosure.
- E88-1662-J31 JBOD Expansion enclosure

The E8 is the latest member of a family of high performance Fibre Channel to SAS/SATA systems. The dual system (E88 models) uses Serial Attached SCSI (SAS) disk drives only and the single controller (E8 models) can use SAS or SATA drives. In addition the system supports a JBOD expansion unit (E8-1262-J31) via wide (4 lane) 6 gigabit SAS ports for future use.

Audience

This User Guide is intended for use by the person installing and/or operating the E8 storage enclosure. For details about the host system, refer to the documentation supplied with the host system.

Related Documentation

- SmartGUI User Guide

Conventions Used In This User Guide

The following conventions are used throughout this User Guide.

A WARNING means beware. There is a risk of electric shock or personal injury. Before working on the enclosure, be aware of the hazards that exist.

A CAUTION means take care. There is a risk of causing damage to the equipment or of losing data.

A NOTE gives general information, such as helpful tips and references to related information.

Chapter 1 – Introduction

Thank you for purchasing your Fibrenetix E8 Series RAID enclosure. Designed for speed, reliability, compatibility and performance, the E8 enclosure is easy to install, providing an outstanding and versatile solution to meet all your data storage requirements. The User Guide presumes that you are familiar with standard computer operations including managing and organizing files and folders. If you are unfamiliar with these operations, please consult your computers User Guide.

Features and Benefits

The Fibrenetix E8 series of RAID enclosures offers an extremely versatile, high capacity solution, perfect for any End-User environment where high performance, problem free mass storage is required, including:

- Backup storage.
- Direct Attached Storage – High-speed local storage device for dedicated workstations.
- Server Attached Storage – High-speed storage device attached to your server.

Features include:

- Single or dual controller models
- RAID levels 0, 1, 0+1, 3, 5, 6, 30, 50, 60 or JBOD
- RAID set migration
- Four 8Gbit Fibre Channel ports per controller
- High performance 6 gigabit SAS expansion channels
- Up to 112 SAS hot-swap hard drives.
- Up to 32 physical drives per individual RAID set
- Up to 4 GB controller cache
- Dual Power and Cooling (PAC) Modules
- Removable push button LCD panel for easy setup and configuration (16 bay only)
- WEB based RAID management via onboard Ethernet
- Variable speed fans
- O/S independent and transparent
- Optimized for high performance, high capacity applications

Understanding RAID

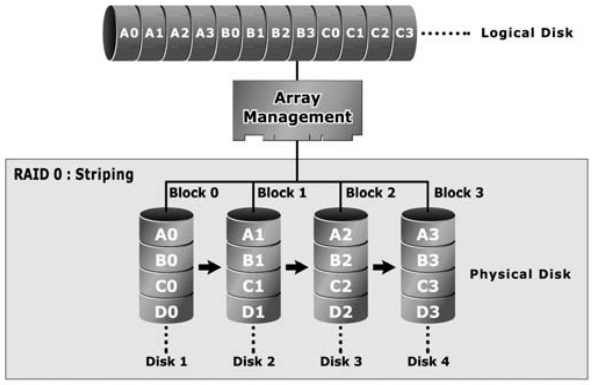
RAID is an acronym for Redundant Array of Independent Disks. A RAID system consists of an array of multiple independent hard disk drives that provide high performance and fault tolerance. The RAID controller implements several levels of the Berkeley RAID technology. An appropriate RAID level is selected when the volume sets are defined or created. This decision is based on disk capacity, data availability (fault tolerance or redundancy) and disk performance.

The RAID controller makes the RAID implementation and the disks physical configuration transparent to the host operating system. This means that the host operating system drivers and software utilities are not affected, regardless of the RAID level selected. Correct installation of the disk array and the controller requires a proper understanding of RAID technology and the concepts.

RAID 0

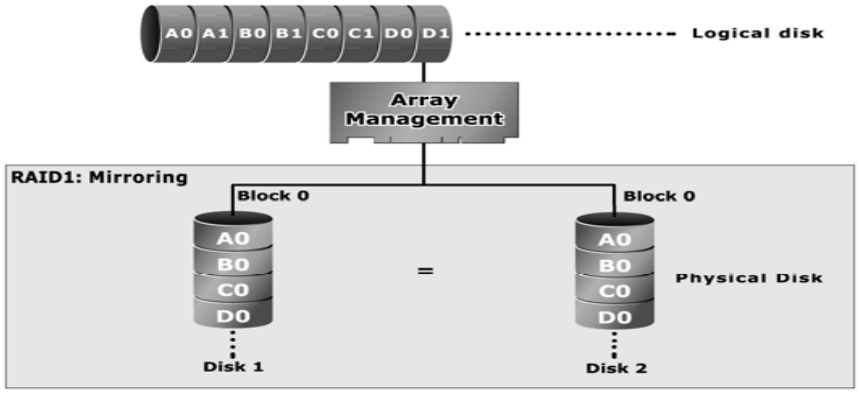
RAID 0, also referred to as striping, writes stripes of data across multiple disk drives. RAID 0 does not provide any data redundancy, but does offer the best high-speed data throughput. RAID 0 breaks up data into smaller blocks and then writes a block to each drive in the array. Disk striping enhances performance because multiple drives are accessed simultaneously; but the reliability of RAID Level 0 is less than any of its member disk drives due to its lack of redundancy.

Figure 1 RAID 0 configuration



RAID 1

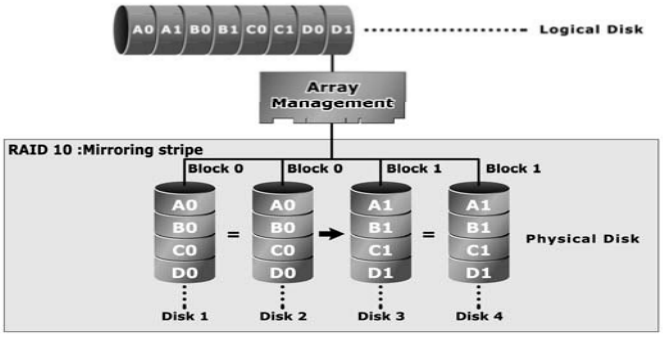
Figure 2 RAID 1 configuration



RAID 1 also known as “disk mirroring”, means that data written to one disk drive is simultaneously written to a second disk drive. Read performance may be enhanced if the array controller can simultaneously access both members of a mirrored pair. During writes, there will however, be a minor performance penalty when compared to writing to a single disk as two writes must occur (one to each disk drive). If one drive fails, all data (and software applications) is preserved on the other drive. RAID 1 offers extremely high data reliability, but at the cost of doubling the required data storage capacity.

RAID 0+1

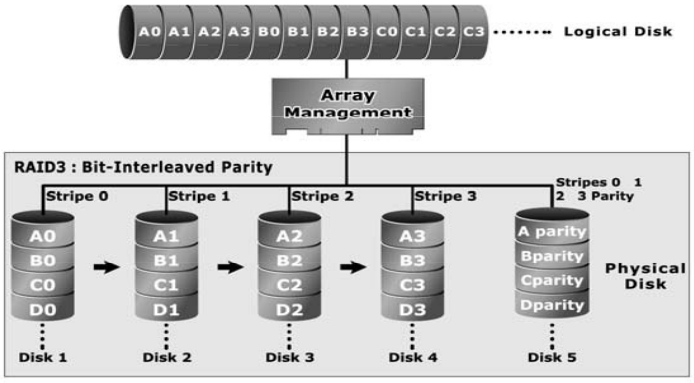
Figure 3 RAID 0+1 configuration



RAID 0+1 is a combination of RAID 0 and RAID 1, combining striping with disk mirroring. RAID Level 0+1 combines the fast performance of Level 0 with the data redundancy of Level 1. In this configuration, data is distributed across several disk drives, similar to Level 0, which are then duplicated to another set of drives for data protection.

RAID 3

Figure 4 RAID 3 configuration

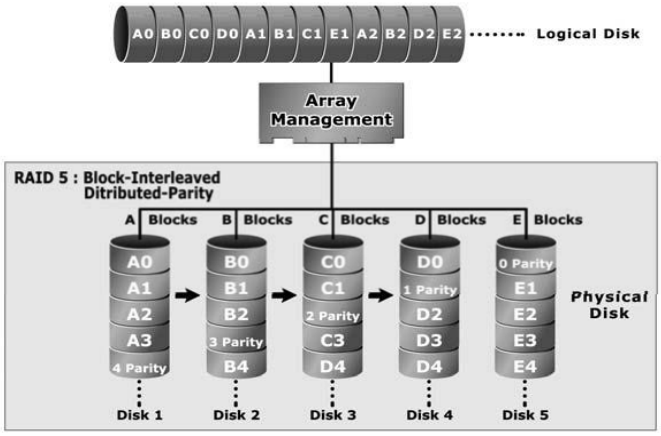


RAID 3 provides disk striping and data redundancy though the use of a dedicated parity drive. RAID 3 breaks up data into smaller blocks, calculates parity by performing an exclusive-or operation on the blocks, and then writes the blocks to all but one drive in the array. The parity data created during the exclusive-or operation is then written to the remaining drive in the array. If a drive fails, data on the failed drive can be recovered using the information on the parity drive. RAID 3 is a good choice for applications that require very fast data transfer rates or large data transfers.

RAID 5

In RAID5, the parity information is written to all of the drives in the array rather than being concentrated on a dedicated parity disk. If one drive in the array fails, the parity information can be used to reconstruct the missing data from that drive. All drives in the array can read and write data at the same time, greatly increasing the performance of the RAID system.

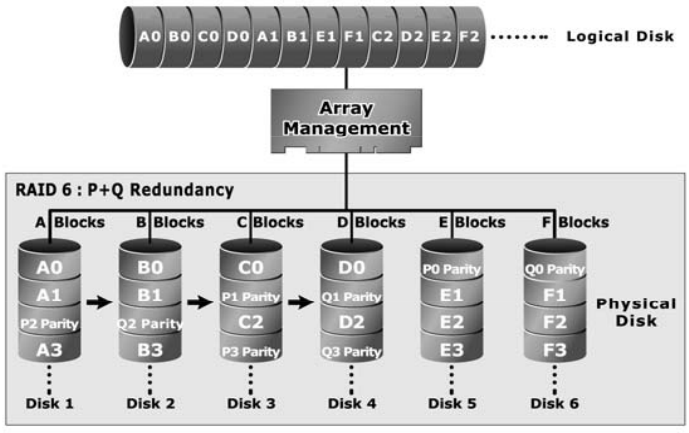
Figure 5 RAID5 configuration



RAID 6

RAID 6 extends a RAID 5 array by using dual distributed parity. Data and parity is striped at block level across all member drives, just like in RAID 5. However, two sets of parity are calculated and written across all the drives. When a disk fails, the data is recovered from the remaining disks. RAID 6 provides the ultimate level of fault tolerance and can sustain two simultaneous drive failures without downtime or data loss. RAID 6 offers a good solution for mission-critical data.

Figure 6 RAID6 configuration



RAID levels 30, 50 and 60 are used to combine multiple RAID sets together to appear as a single volume.

Chapter 2 – Initial Setup and Installation

This Chapter describes the installation and set up of the E8 storage enclosure. Important safety details are described along with the environmental and electrical precautions that must be taken. The location of components within the enclosure is also shown.

Please read this chapter carefully before attempting to install or operate the E8 enclosure.

Safety Statements

The following safety requirements must be understood before you install or operate the system.

Warning: Disconnect all power supply inlets before opening the E8 series storage enclosure for maintenance.

Caution: Do not place the enclosure on an uneven or unstable work surface.

Caution: Do not place or drop objects onto the enclosure and do not force any foreign objects into it.

Caution: Do not expose the E8 series storage enclosures to extreme temperatures (below 5 ºC or above 40 ºC) or to direct sunlight.

Caution: Allow disk drives and power supplies to reach ambient room temperature before applying power to the enclosure.

Unpacking

When you receive the system, visually inspect the exterior of the packaging for any signs of damage. If any damage is found, you should inform your distributor. Once the packaging is opened, the contents should be checked against the enclosed Packing List. If any items are missing or damaged you should contact your distributor immediately.

Environmental Considerations

This section outlines the environmental factors that must be considered when choosing a suitable location to install the storage enclosure.

Temperature

The operating temperature of the storage enclosure is between 5°C and 40°C. However, it is not recommended that the enclosure be continuously run at these extreme temperatures. Consideration should therefore be give to ensure that the room ambient temperature is compatible with these specifications.

Air Flow

To ensure that internal heat built up is properly dissipated into the surrounding environment, the enclosure should be positioned such that no air vents are blocked or obstructed in any way. Failure to ensure this can lead to heat build up in the enclosure and damage to the components.

Electrical Considerations

You must ensure that the required current does not exceed the rating of the power source. This includes cabling, power distribution units, filters and any other devices through which the main current flows. Surge currents must be catered for. Disk drives may consume twice the amount of current at start-up time as they do during steady state operation.

Installing a Disk Drive

Warning: Disconnect the power supply inlets before opening the storage enclosure for maintenance.

Caution: Do not place or drop objects onto the enclosure and do not force any foreign objects into it.

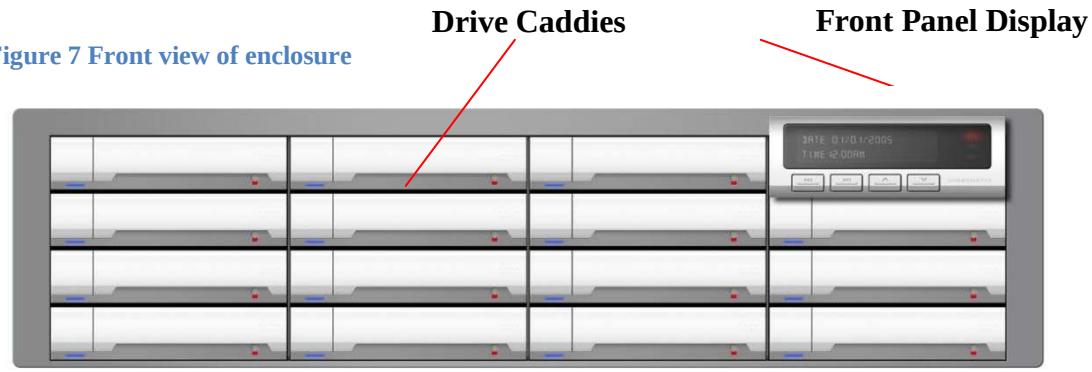
To install a Disk Drive caddy in the storage enclosure, follow the procedure below:

1. Orient the caddy so that the LED indicator is at the left hand side.
2. With the locking lever fully open, gently slide the caddy into the desired slot on the front of the enclosure.
3. When the caddy is in all the way, slowly close the locking lever until it clicks into place.

Locating Components

The following picture of the E88-1664-F281 shows where the components are located within the enclosures.

Figure 7 Front view of enclosure



The above drawing shows the front view of the enclosure. The LCD panel is designed to be removable (16 bay model only). This is important in many high end applications where security is an important consideration. It also facilitates serviceability as many other vendors do not provide an easy method of replacing this unit.

Note: The JBOD enclosure does not feature an LCD panel.

The picture below shows the E88-1264-F281, the dual PAC modules are shown at the left and right side of the chassis with the RAID controllers in the middle section. The port designations are shown below and the 16 bay system has a similar arrangement. Configuration is achieved either by the RS-232 terminal configuration port or through the LAN interface. The debug port is for engineering use only. The Fibre Channel host ports are designated channel 0 through 3 as viewed from left to right.

Figure 8 Rear view of E88 12 bay dual RAID enclosure

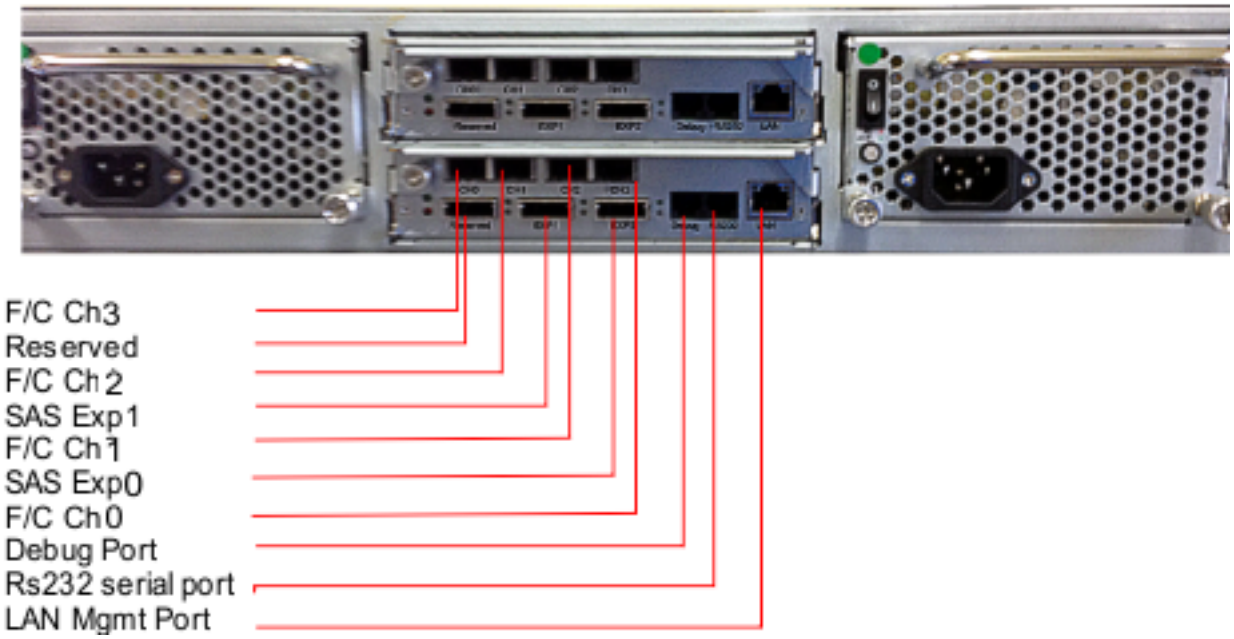
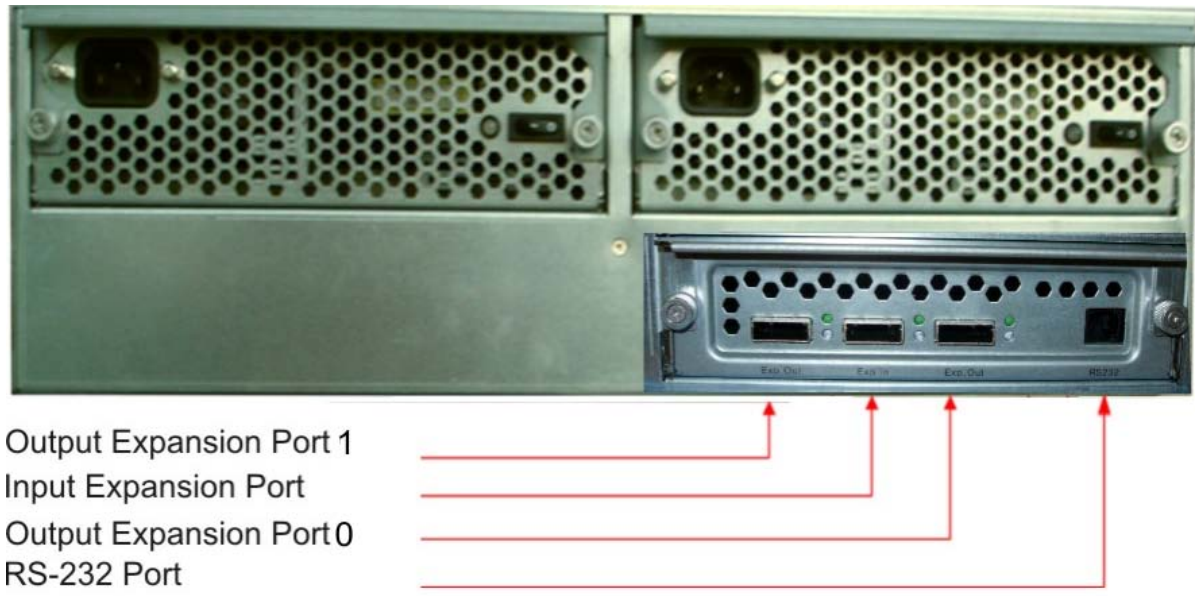


Figure 9 Rear view of E8 16 bay JBOD enclosure



FRU removal

Power and Cooling (PAC)

The PAC modules can be easily removed by unscrewing the thumbscrews and pulling it outwards.

RAID Controller

To gain access to the RAID controller unscrew the thumbscrews in an anti-clockwise direction, lower the latch assembly and pull the controller outwards.

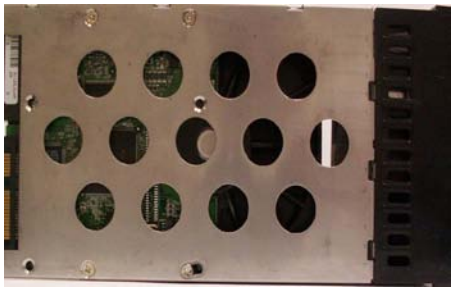
LCD Panel

The LCD panel (16 bay only) is removed by depressing the button on the right hand side of the panel assembly and swinging outwards whilst pulling the panel towards you. Replace by inserting the retaining hook on the left hand side of the panel into the receiver and ensuring that the pins are correctly mated gently push inwards.

Drive Carrier

The drives are mounted in purpose designed caddies. The caddies are designed for hot swap operation with a damping handle and EMI shielding. Status information is conveyed via a light pipe. Removal of the drive carrier is achieved by pressing on the upper part of the handle on the right hand side above.

Figure 10 Drive mounting

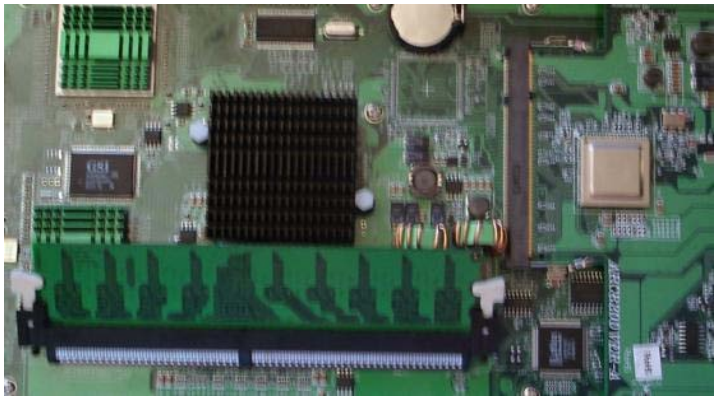


The drives are mounted from the underside of the drive caddy by the four screws shown above.

Upgrading the memory

The memory installed in the RAID controller module can be upgraded by removing the controller as described above and removing the memory by opening the securing clips. Insert the new memory in its place by orienting the memory correctly and firmly inserting it into the socket. When the memory is correctly inserted, the securing clips should snap into place.

Figure 11 Upgrading/replacing memory



Chapter 3 – Initial Configuration

This Chapter describes how to install the hardware and how to connect to and access the RAID controller.

Note: A maximum of 32 physical drives is allowed per RAID set.

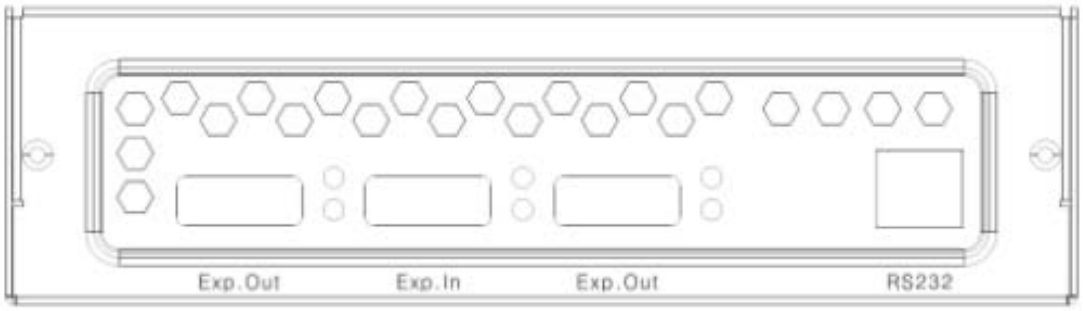
Attaching the Fibre Channel Cables to Fibre Channel enclosures

There are four Fibre channel SFP Ports on the rear of the enclosure at the rear of the unit. Insert the SFP adapters and then attach the FC cabling to these ports. Ensure that the HBA drivers are loaded correctly.

Attaching the SAS Channel Cables to a JBOD enclosure

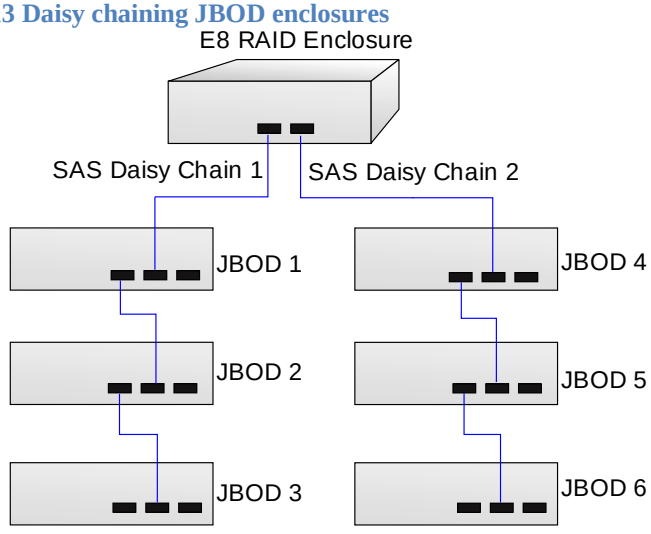
The SAS JBOD cable is supplied with the JBOD expansion enclosure and connects from a SAS expansion port of the E8 (shown in Figure 13) to the Exp. in port of the JBOD shown in Figure 12. The connector type is mini-SAS.

Figure 12 Rear view of JBOD I/O module



A maximum of 7 enclosures (1X16 bay RAID chassis + 6X16 bay JBODs) can be connected with a total of 112 devices. The following diagram shows the recommended method for adding additional JBOD enclosures.

Figure 13 Daisy chaining JBOD enclosures



Maximum of 112 devices using 6 x 16 bay JBODs and 1 x RAID enclosu

Note: When adding JBOD enclosures follow the order shown in Figure 13 above.

Power sequencing of subsystems

Power up

1. Apply power to JBOD enclosures
2. Wait one minute to allow drives to come up to speed
3. Power up RAID enclosure

Power down

1. Halt host I/O activity
2. Allow time for RAID controller cache to flush
3. Power down the RAID enclosure
4. Power down the JBODs

Accessing the RAID Controller

Following the hardware installation, the RAID subsystem disk drives must be configured and the volume sets initialized, before they are ready to use. This is carried out using one of the following methods:

- VT100 terminal connected through the RAID subsystem serial port.
- Firmware-embedded TCP/IP & web browser-based RAID manager via the 10/100 Ethernet LAN port.

The embedded RAID manager provides complete control and management of the RAID subsystem, eliminating the need for additional hardware or software.

NOTE: The RAID subsystem must only be accessed through one method at a time.

VT100 terminal (via serial port)

The serial port located at the rear of the unit can be used in VT100 mode. The interface cable provided connects the RS232 port to a PC. The embedded RAID management interface can access the array through the RS-232 port. You can attach a VT-100 compatible terminal or a PC running a VT-100 terminal emulation program to the serial port to access the text-based Set-up Menu. The default password is “0000” (without quotes).

RAID subsystem RS-232C Port Configuration

To ensure proper communications between the RAID subsystem and VT-100 Terminal Emulation program, use the following communication settings:

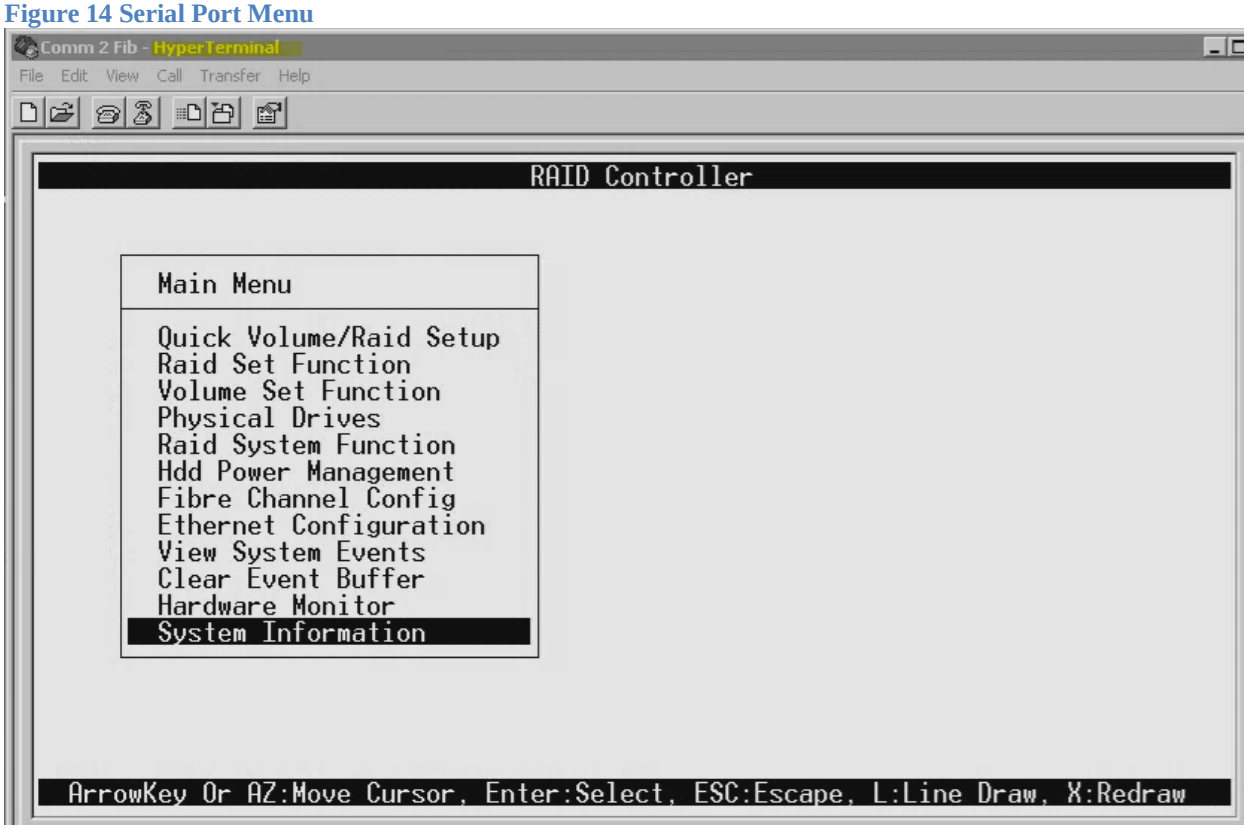
Connection	**Null-modem cable**
Baud Rate	**115,200**
Data bits	**8**
Stop	**1**
Flow Control	**None**

By connecting a VT100 terminal, or a PC operating in an equivalent terminal emulation mode, all RAID subsystem monitoring, configuration and administration functions can be carried out.

There are a wide variety of Terminal Emulation packages available, such as `Hyperterm`. Open the Terminal Emulator of your choice , and configure the Settings of the Terminal port as shown in the Terminal Requirements table above.

When the VT100 Terminal set-up is complete, you can press the " X " key (on your Terminal) to link the RAID subsystem and Terminal together. The disk array Monitor Utility screen is displayed on your VT100 Terminal.

Figure 14 Serial Port Menu



Please refer to the SmartGUI User Guide to continue with the configuration of the enclosure using the VT-100 terminal software.

Web browser-based RAID manager

The Firmware-embedded web browser RAID manager is a HTTP–based application, which utilizes the browser installed on your operating system. You can use the Ethernet LAN port (see Chapter 2 for location of components) to configure the subsystem without any additional software or drivers.

It is possible to manage the RAID subsystem remotely without adding any user specific software (platform independent) via standard web browsers connected directly to the 10/100 Ethernet RJ45 LAN port.

To configure the RAID subsystem on a local or remote machine, you need to know its IP Address. The default IP address is detailed on the Product Documentation and Quality Sheet provided with the unit and is shown on the front panel display when the system is powered up. To launch the TCP/IP & Web Browser-based RAID Manager enter:

http://[IP Address]

NOTE: You must be logged-in as administrator with local admin rights on the workstation to remotely configure RAID subsystem. The user name and password are case sensitive. The default values are:

User Name: "admin" Password: "0000"

Note: The default IP address can be changed through the front panel prior to GUI operation. See page 15 for a description of front panel operation.

Web browser-based RAID manager via HTTP Proxy

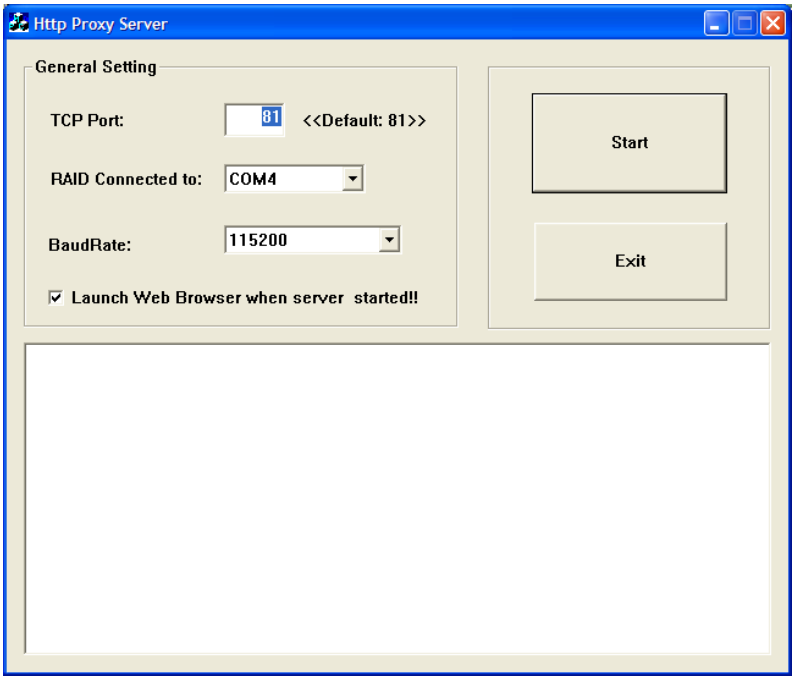
The browser based RAID manager can be accessed via a HTTP Proxy. The Fibrenetix system comes with proxy software for Windows based host systems. To run the proxy software, double click on the executing file `archttp.exe`. The `Archttp` dialog box appears. This allows a HTTP session to be established via the serial port. Connect the supplied serial cable to an unused com port on the server and enter the com port number in the dialog shown in the diagram below.

The Parameters for the General Setting are:

- TCP Port value = 1 ~ 65535.
- RAID Connected to value = 1 ~ 10 where 1 is for COM1, 2 for COM2 and so on...
- BaudRate value = {2400, 4800, 9600, 19200, 38400, 57600, 115200}

NOTE: The RAID controller default baud rate is 115200.

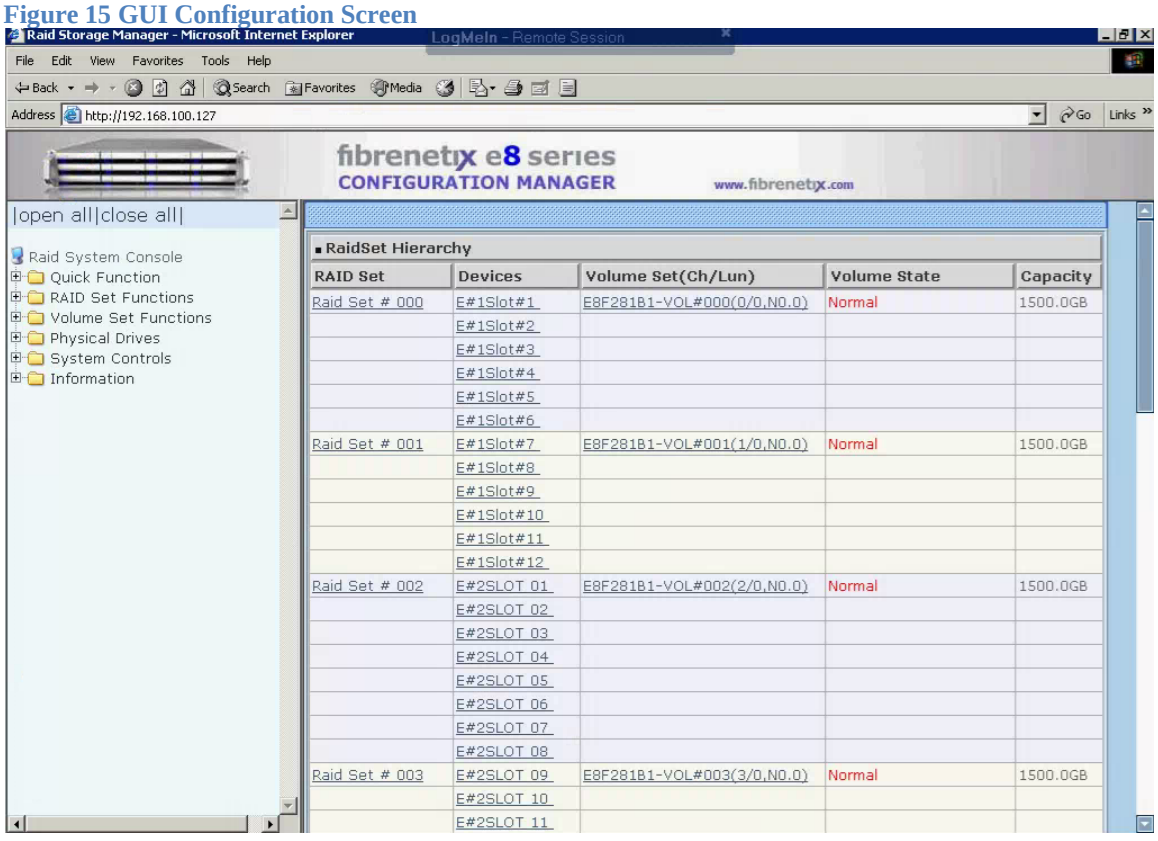
When the program starts running, the following window appears:



To start the ArcHttpProxy Server web-browser management, click **Start**.

Type the User Name and Password when prompted. The RAID controller default User Name is "**admin**" and the Password is "**0000**". After entering the user name and password, press **Enter** to start-up the Http Proxy Server. The RAID Management software is now accessible as shown below:

Figure 15 GUI Configuration Screen



NOTE: Alert by Email Configuration can only be set in the web-based configuration

Front Panel Operation

The system (16 bay only) can also be configured from the front panel display. It is recommended that detailed configuration is performed using normal keyboard or mouse input rather than through the front panel, however the display is useful for setting up IP addresses prior to more involved configuration and reading status information. Interaction with the keypad is achieved by using the four buttons shown in the following diagram:

The four buttons are designated as follows:

- **esc** – Backs up a level
- **ent** – Selects a menu option
- ↓ - Moves forward to next field
- ↑ - Moves backward to next field

The default password is “0000” which may be entered through the panel.

Front Panel removal and insertion

Removal

- Depress and hold the Front Panel removal button, which is mounted on the right hand side or the front panel.
- Gently swing the right hand side of the Front Panel away from the main chassis.
- Move the Front Panel slightly to the right and remove.

Insertion

- Slip the left hand side of the Front Panel into its mounting hole on the main chassis.
- Depress and hold the Front Panel removal button.
- Gently swing the right hand side of the Front Panel towards the main chassis until there is contact between the Front Panel and the main Chassis.
- Holding the Front Panel in Place release the Removal button.
- Now push the ESC button on the Front Panel to reactivate it.

Refer to the SmartGUI manual for further information on configuration.

Appendix A

Troubleshooting

Q. I have created a 2.5 TB LUN and my Operating System does not recognize the full capacity.
A. Ensure that your Operating System supports volumes sizes greater than 2 TB. This is achieved by using 16 bit SCSI Command Descriptor Blocks. If the Operating System does not support this (versions of Windows prior to WIN2K3 Service Pack 1) then you have the ability to use 4K block sizes rather than 512 bytes to overcome this limitation. Note that dynamic disk support is not available when using non standard block sizes.

These options are presented to the user when volumes greater than 2TB are initially configured.

Q. My Operating system does not recognize the newly created volume.
A. Verify that the HBA drivers are correctly loaded, if the HBA supports BIOS recognition, check to see if the volume is recognized at the BIOS level. Ensure that the volume is correctly mapped to the appropriate host channel (refer to the SmartGUI user manual for information on volume mapping).

Q. My Fibre Channel system is not operating correctly at 8 gigabit speeds.
A. Hard set the E8 for 8Gb operation and Loop Topology. Refer to the SmartGUI user manual for information on setting the FC host speed.

Q. I have created a volume set and my Operating system does not “see” the device.
A. Verify that the volume is mapped to the appropriate channel, by default volumes are mapped to channel 0. Ensure that the Host Bus Adapter device drivers are correctly loaded.

Appendix B

Technical Specifications

System

Max number of devices:	112
Max number of disk drives per RAID set:	32
Maximum number of drives per enclosure	12/16
Supported RAID levels:	JBOD, 0, 1, 0+1, 3, 5, 6, 30, 50, 60
Host Bus Interface:	Quad 8GBit Fibre Channel
Maximum controller cache	4 GB
System setup and mgmt:	RS-232, telnet, Web-browser and SNMP
System Alarms/Alerts:	Audible alarm, LEDs, RS-232,Web-browser, Email and SNMP traps
Power supplies and Cooling	Combined redundant power and cooling Modules.

Physical Dimensions

Height:	3 U 13.35cm (5.25 inches)
Width:	48.25cm (19 inches)
Depth:	52.07cm (20.5 Inches)
Weight:	TBA

Power Supply

AC Input Voltage:	100V-240V
Input Frequency:	50-60Hz
Peak output Power:	TBA

Temperature

Operating Temperature:	5°C to 40°C
Non-operating Temperature:	-40°C to +65°C
Maximum rate of Temperature change	20°C per hour

Humidity

Relative operating humidity:	10% to 80%, non-condensing
Non-operating humidity:	10% to 95%, non-condensing

Altitude

Operating Altitude	-61m to 3,048m (-200ft. to 10,000ft)
Non-operating Altitude:	-61m to 12,000m (-200ft. to 39,370ft)